

REMARKS

Claims 1, 2, and 6-8 are pending in this application. By this Amendment, claim 1 is amended to incorporate the subject matter of claims 4 and 5. Claims 1 and 2 are amended to more precisely define the subject matter recited in the present claims. Claims 6, 7 and 8 are added and are supported by page 1, lines 15-19 of the specification. Claims 4 and 5 are canceled. No new matter is added by this Amendment.

The courtesies extended to Applicants and Applicants' representatives by Examiner Zhu at the interview held April 15, 2008, are appreciated. The reasons presented at the interview as warranting favorable action are incorporated into the remarks below, which constitute Applicants' record of the interview.

I. Rejections Under 35 U.S.C. §103(a)

Claims 1, 2, 4 and 5 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over JP 2000-001765 ("JP 765") in view of U.S. Patent No. 5,580,397 ("Meyer"). Applicants respectfully traverse this rejection.

The Patent Office alleged that the acetylene to ethylene ratio of 0.428 described in JP 765 is a result-effective variable because the acetylene to ethylene ratio would allegedly have directly affected the surface carbon concentration, the carbon concentration gradient, microstructures, soot generation and the cost of the carburizing process. See Office Action, pages 2-3 (citing JP 765, paragraphs [0025] and [0026]). Furthermore, the Patent Office alleged that Applicants' Rule 132 Declaration filed on November 15, 2007, did not demonstrate the criticality and/or unexpected results of the claimed acetylene to ethylene ratio of 0.55 to 2.0. Applicants respectfully disagree.

At the interview, Examiner Zhu stated that the present rejection would most likely be withdrawn if Applicants submitted evidence demonstrating that an acetylene/ethylene ratio of

0.428 (i.e., the ratio in JP 765) and an acetylene/ethylene ratio of 0.55 (i.e., lower end of the ratio in the present claims) provides unexpectedly different results.

Attached hereto is an additional Rule 132 Declaration ("Declaration"), demonstrating that the presently claimed acetylene to ethylene gas mixture for the under-pressure carburizing of steel achieves unexpectedly improved hydrocarbon (i.e., acetylene and ethylene) decomposition together with a more efficient carbon transfer from a gaseous phase to steel, even at the lower end of the acetylene to ethylene ratio recited in claim 1 (0.55) in comparison to an acetylene to ethylene ratio 0.428 (the ratio disclosed in JP 765).

Specifically, as shown in Figure 2 of the Declaration, at a boost time of 20 minutes, the amount of hydrogen in Experiment 1 (i.e., an acetylene to ethylene ratio of 0.55) was approximately 81%, while the amount of hydrogen in Experiment 2 (i.e., an acetylene to ethylene ratio of 0.428) was approximately 75%. Moreover, as shown in Figure 4a of the Declaration, the charge used in Experiment 1 displayed a perfect purity with only single microscopic scaled traces of soot and tar by-products remaining on the charge's surface. In contrast, as shown Figures 4b-4d of the Declaration, the charges used in Experiments 2-4, respectively, did not display a perfect purity with single microscopic scaled traces of soot and tar by-products remaining on the charge's surface.

As such, the present claims employing an acetylene to ethylene ratio of 0.55 to 2.0 cannot be considered to have been obvious from JP 765, at least because the Declaration demonstrates that the recited range of acetylene to ethylene provides unexpectedly improved properties.

Furthermore, Meyer does not remedy the deficiencies of JP 765. Meyer, at best, describes that hydrogen and nitrogen gases may be included in a gas carburizing mixture. See Meyer, col. 1, lines 51-53. However, the experimental results in the Declaration also demonstrate that the inclusion of hydrogen gas as the third component along with an

acetylene to ethylene mixture at a ratio of 0.55 of a hydrocarbon gas mixture unexpectedly improves hydrocarbon decomposition. As shown in Figure 3 of the Declaration, the three-component mixture used in Experiment 1 and Experiment 2 (i.e., acetylene to ethylene ratio of 0.55 and 0.428, respectively) had a significantly greater absolute hydrogen content than Experiment 3 (i.e., acetylene to ethylene ratio 0.428 and no hydrogen gas). Furthermore, the hydrocarbon decomposition for Experiment 2 is also less than the hydrocarbon decomposition for Experiment 1, especially in the initial period of boost stage (i.e., 12 min). For this additional reason, the evidence establishes that claim 1 would not have been obvious from JP 765, alone or in combination with Meyer.

Applicants thus submit that the unexpected results and criticality achieved by a three-component hydrogen gas mixture for the under pressure carburizing of steel with an acetylene to ethylene ratio of 0.55 to 2.0 demonstrate that JP 765 alone, or in combination with Meyer, does not describe the claimed subject matter.

Reconsideration and withdrawal of the rejection are thus respectfully requested.

II. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1, 2, and 6-8 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



James A. Oliff
Registration No. 27,075

Christopher W. Brown
Registration No. 38,025

JAO:CWB/jdt

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OLIFF & BERRIDGE, PLC
P.O. Box 320850
Alexandria, Virginia 22320-4850
Telephone: (703) 836-6400

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